

Labor Market Returns to Very Early Childhood Stimulation

Paul Gertler, UC Berkeley

Sally Grantham-McGregor, U of College London

James Heckman, U of Chicago

Christel Vermeersch, World Bank

Susan Walker, U of West Indies

Arianna Zanolini, U of Chicago

Santiago Chile, November 2011

Over 200 million children at risk of not achieving full developmental potential (Grantham-McGregor et al., *Lancet* 2007)

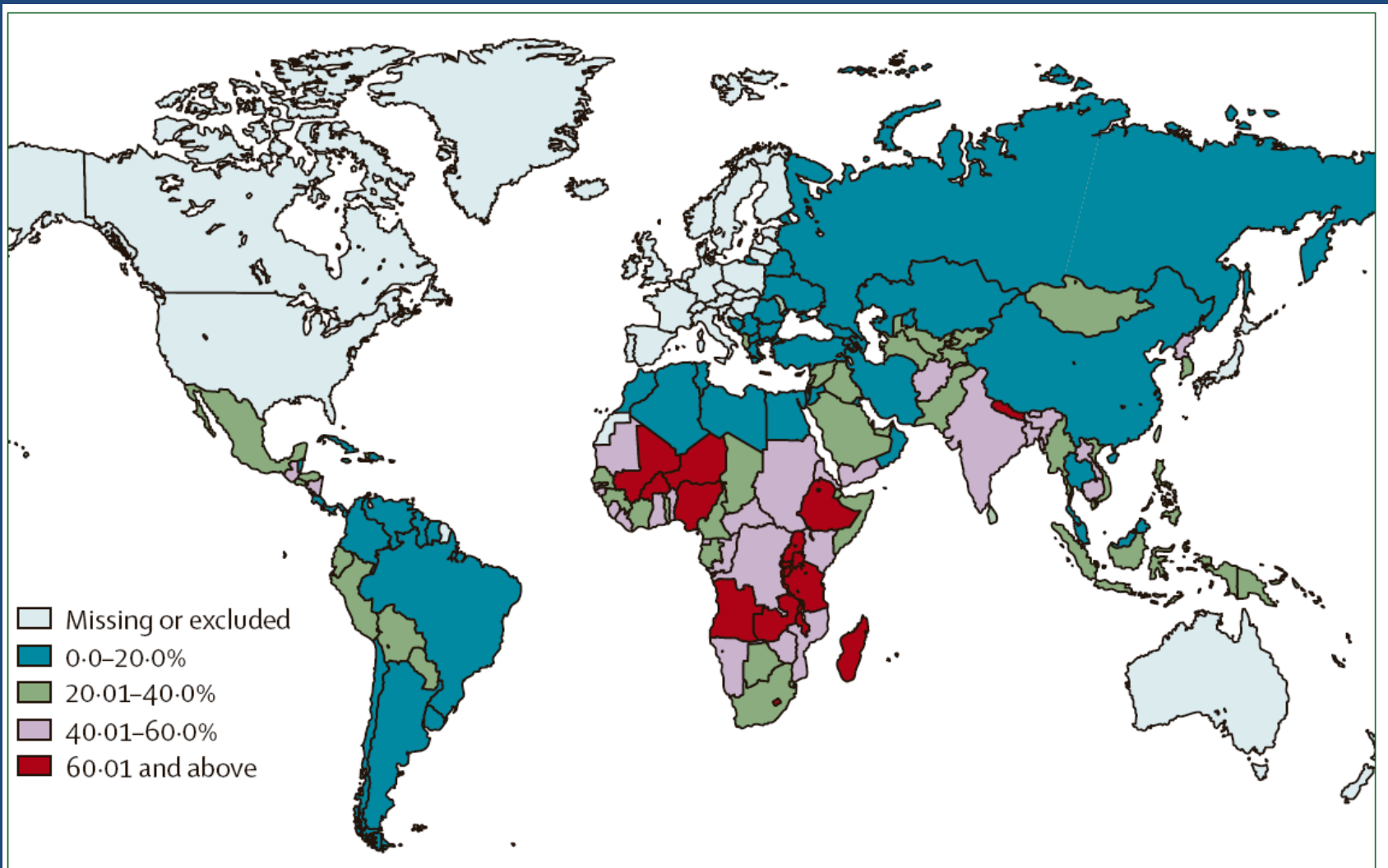


Figure 5: Percentage of disadvantaged children under 5 years by country in year 2004

The Case for Investing in Early Childhood Development

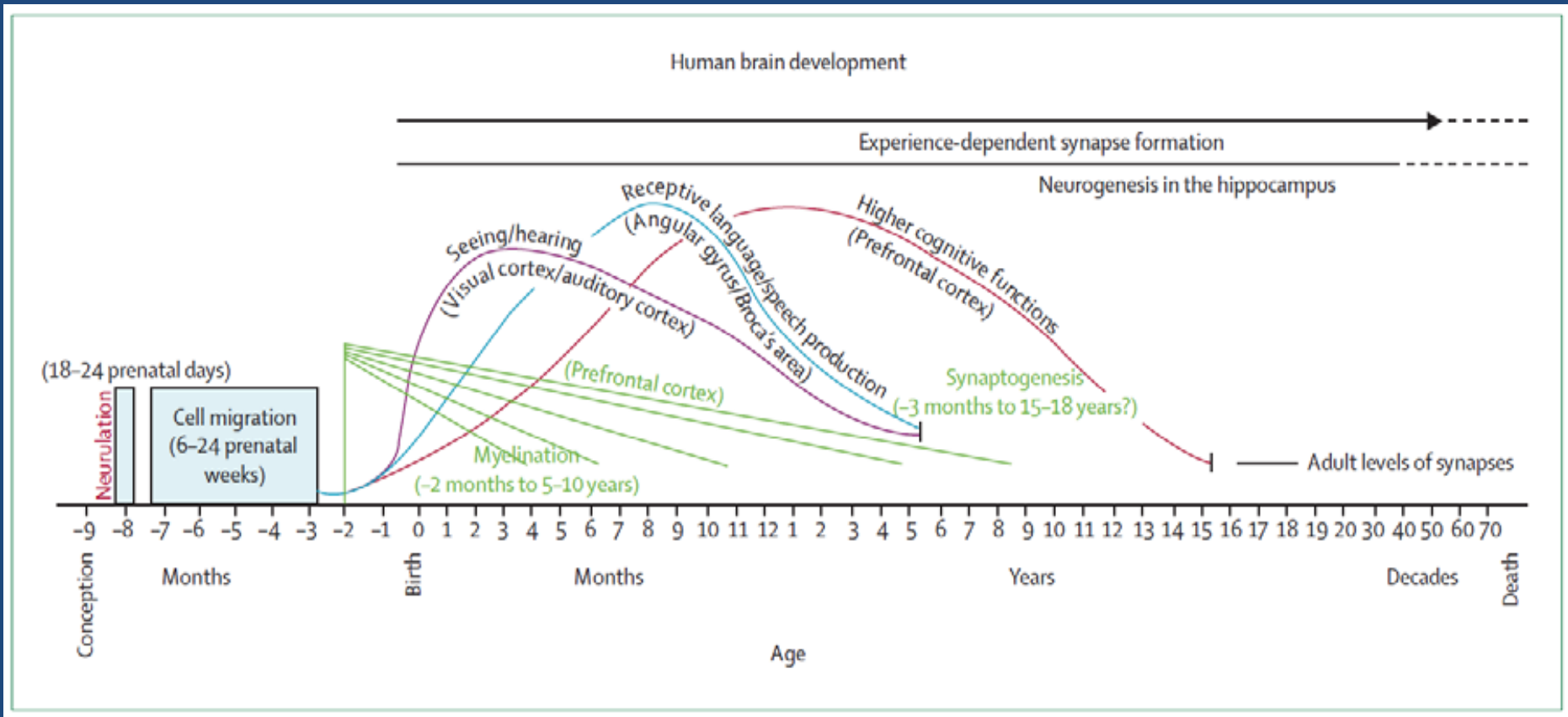
- Early experiences affect brain function -- cognitive & socio-emotional development
- Inequality sets in long before enter school
 - Lifetime of disadvantage (education & earnings)
- ECD makes up for early deficits in short-term
- Can ECD make up for deficits in long-term?
 - Labor MKT returns to very early childhood stimulation
 - Evidence from 20 year follow-up in Jamaica

Jamaica Study was 1st to provide empirical evidence on very early childhood stimulation

- Grantham-McGregor SM, Powell CA, Walker SP, Himes JH. Nutritional supplementation psychosocial stimulation, and mental development of stunted children: the Jamaican Study. *Lancet*. 1991;338(8758):1–5
- Walker SP, Chang SM, Powell CA, Grantham-McGregor SM. Effects of early childhood psychosocial stimulation and nutritional supplementation on cognition and education in growth-stunted Jamaican children: prospective cohort study. *Lancet*. 2005; 366(9499):1804 –1807
- Walker SP, Chang SM, Powell CA, Smirnoff E, Grantham-McGregor SM. Effects of psychosocial stimulation and dietary supplementation in early childhood on psychosocial functioning in late adolescence: follow-up of randomized controlled trial. *BMJ*. 2006; 333:472
- Walker SP, Powell CA, Grantham-McGregor SM, Himes JH, Chang SM. Nutritional supplementation, psychosocial stimulation, and growth of stunted children: the Jamaican study. *Am J Clin Nutri*. 1991;54(4): 642– 648
- Grantham-McGregor SM, Walker SP, Chang SM, Powell CA. Effects of early childhood supplementation with and without stimulation on later development in stunted Jamaican children. *Am J Clin Nut*. 1997;66(2): 247–25
- Walker SP, Grantham-McGregor SM, Hime, JH, Powell CA, Chang SM. Early childhood supplementation does not benefit the long-term growth of stunted children in Jamaica. *J Nutrition*. 1996;126(12):3017–3024
- Walker SP, Grantham-McGregor SM, Powell CA, Chang SM. Effects of growth restriction in early childhood on growth, IQ, and cognition at age 11 to 12 years and the benefits of nutritional supplementation and psychosocial stimulation. *J Pediatrics*. 2000;137(1): 36–41
- Walker SP, Chang SM, Vera-Hernández M, Grantham-McGregor SM. Early Childhood Stimulation Benefits Adult Competence and Reduces Violent Behavior. . *J Pediatrics*. 2011;127:849–857

Preschool maybe too late!

Early childhood developmental Timeline



- Skills emerge at different rates and ages
- First 3 years of life critical in development of the brain

Jamaican Study Design

- 129 Stunted children between 9 & 24 months
- Randomly assigned into 4 groups
 1. Cognitive stimulation intervention only
 2. Nutritional intervention only
 3. Both cognitive and supplementation
 4. No intervention
- Recruited non-stunted sample for comparison

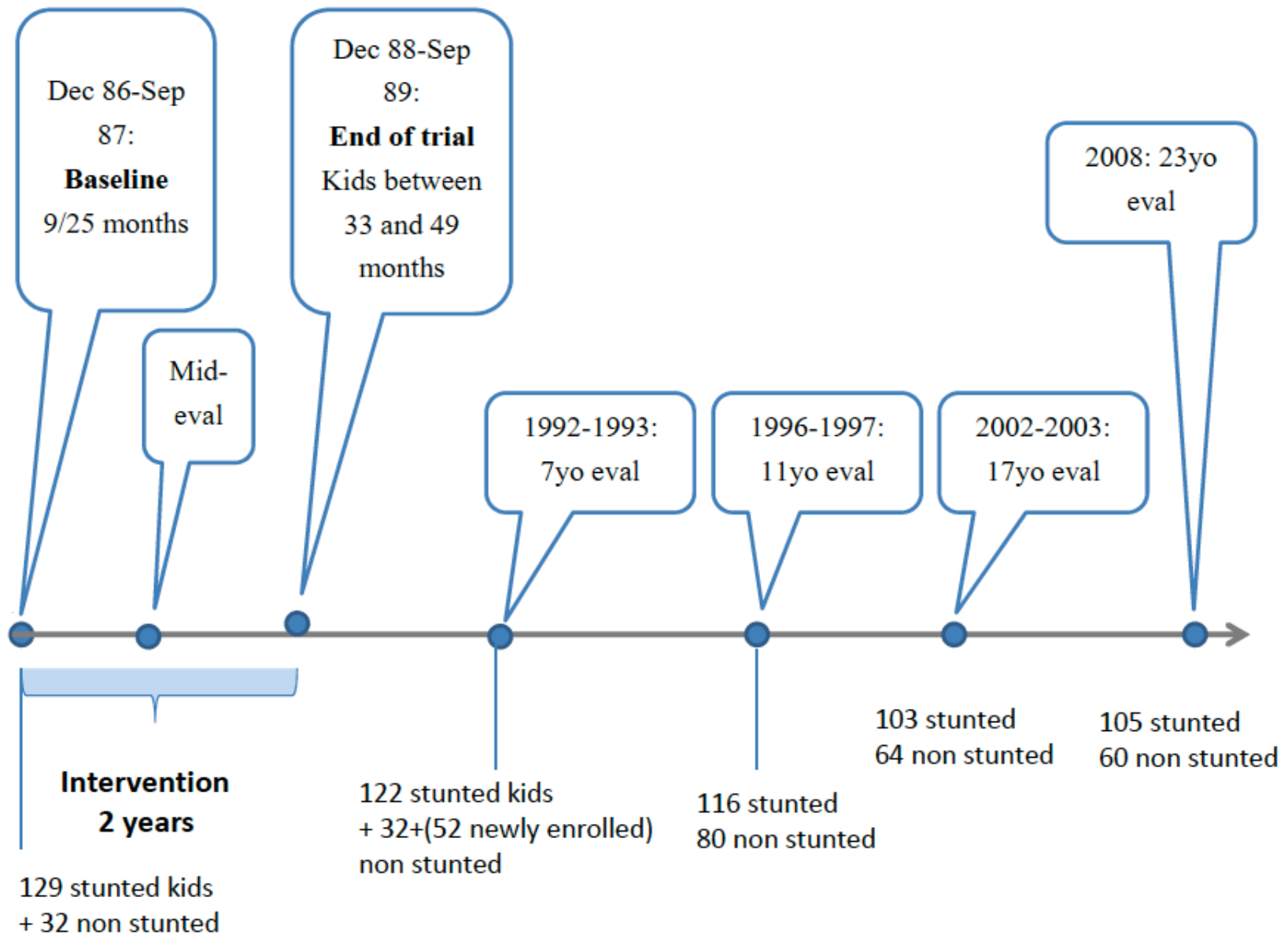
Cognitive Stimulation Intervention

- Weekly play sessions at home with a community health aid (CHA)
 - for 2 years -- 1 hr per week
- CHA taught mothers how to play w/ children that promotes development
- Home-made toys were left after each visit

Nutritional Intervention

- Child Supplement
 - 1 kg milk-based formula per week
 - 750 kcal and 20 g protein daily
- Family Nutrition Package
 - 9 kg cornmeal & skimmed milk powder
 - Minimize sharing supplement with other family members

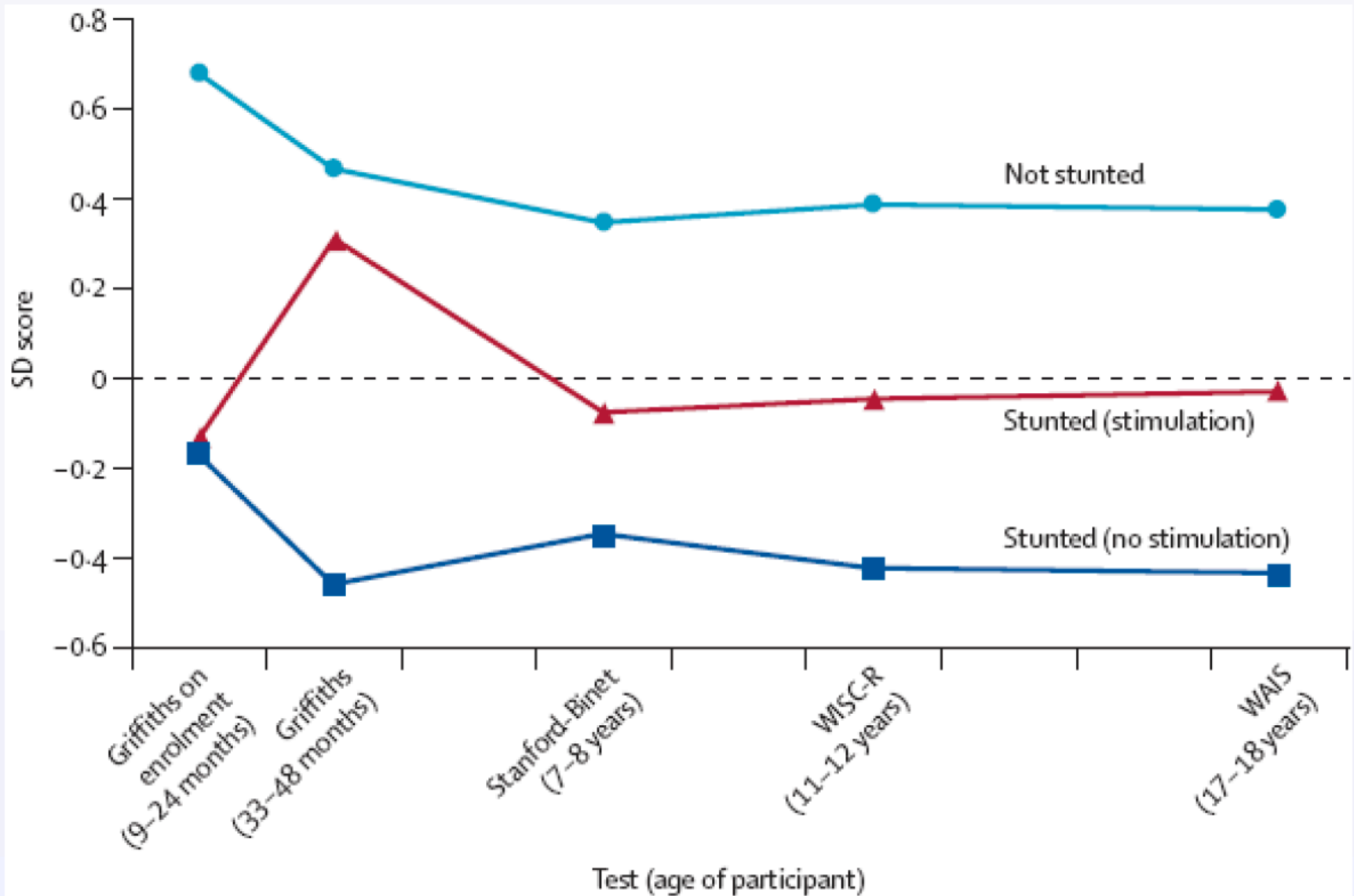
Intervention Timeline



Previous Studies' Findings

- Large effects of stimulation on cognitive and socio-emotional development that persist through age 18
- Nutritional supplement effects fade out after 7 years
- No differences in effects of stimulation and combined stimulation arms starting at age 7
- Hence, combine arms for our analysis
 - Treatment group: stimulation plus combine stim/sup
 - Control group: pure control plus supplementation group

Effect of stimulation on Cognitive Development



We resurveyed participants at age 22

- Added labor history module
 - 1st job
 - Last job
 - Current job
- Followed migrants to UK and US
 - Found 105 out of 127 original participants
 - No differential attrition

Table 6: Migration Out of Jamaica

Age of Migration	Full Sample at Baseline		Sample Found at 22 Years Old	
	T	C	T	C
2 -7 Years Old	2	1	1	0
8 -11 Years Old	5	1	5	0
12 - 18 Years Old	4	6	4	3
19 - 22 Years Old	4	0	1	0
Total	15	8	11	3
Migration Share	0.23	0.12	0.21	0.06

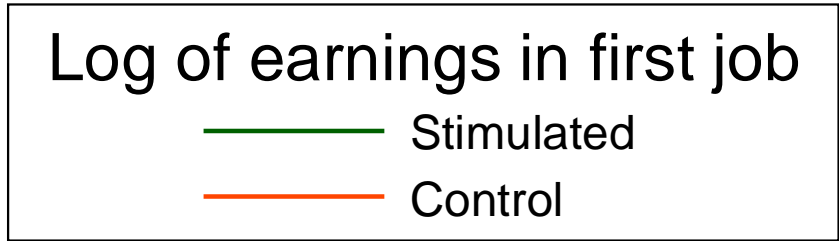
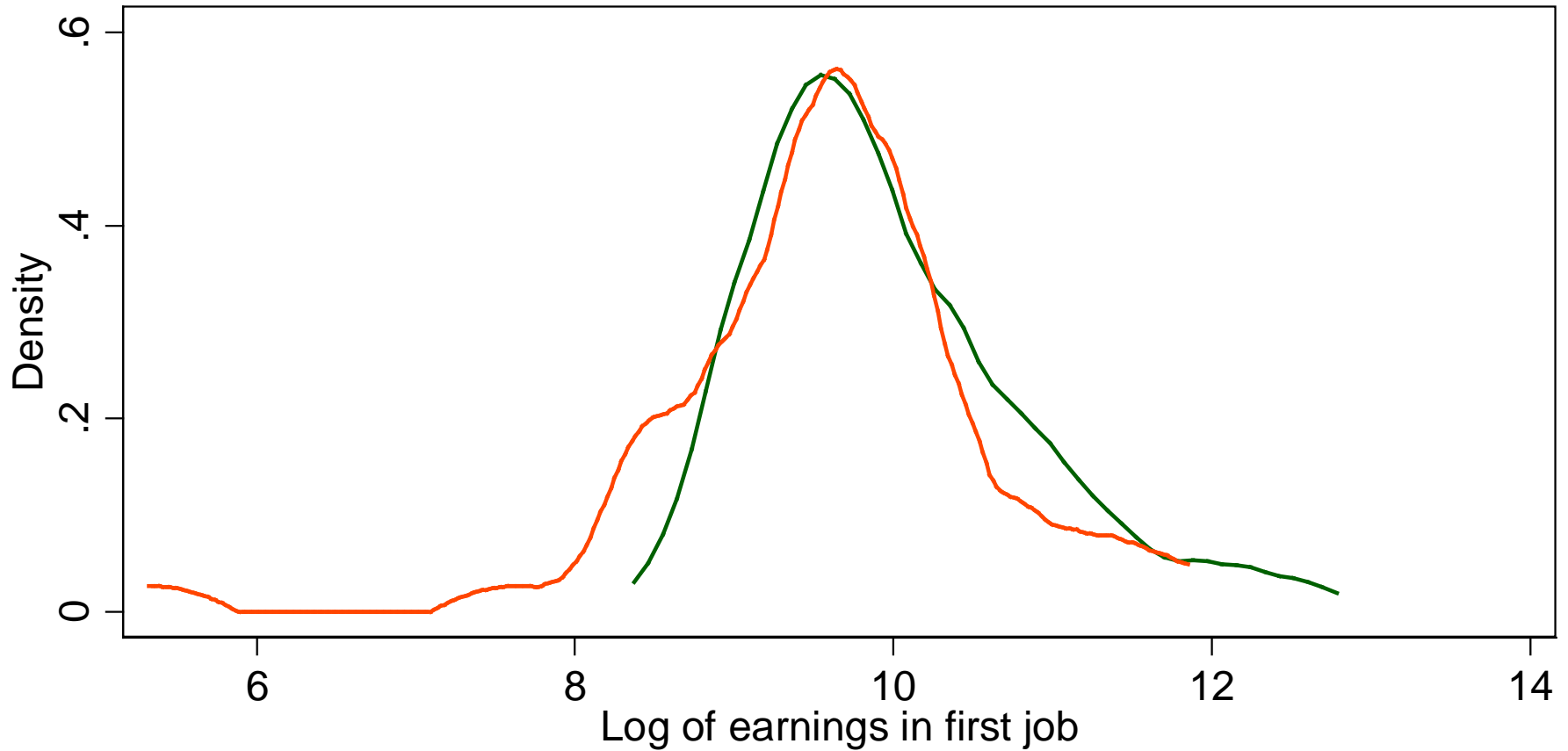
Effects of Stimulation on Educational Outcomes

	Control Mean	Estimated Effect	P-Value
Total years school	10.81	0.76	0.004
Any college	0.04	0.12	0.030
Still in school	0.04	0.20	0.000
Passed 1 CXC exam	0.21	0.11	0.122
Passed > 1 CXC exam	0.00	0.08	0.024
Ever expelled school	0.17	-0.16	0.012

Table 4: Effect on Labor Market Outcomes

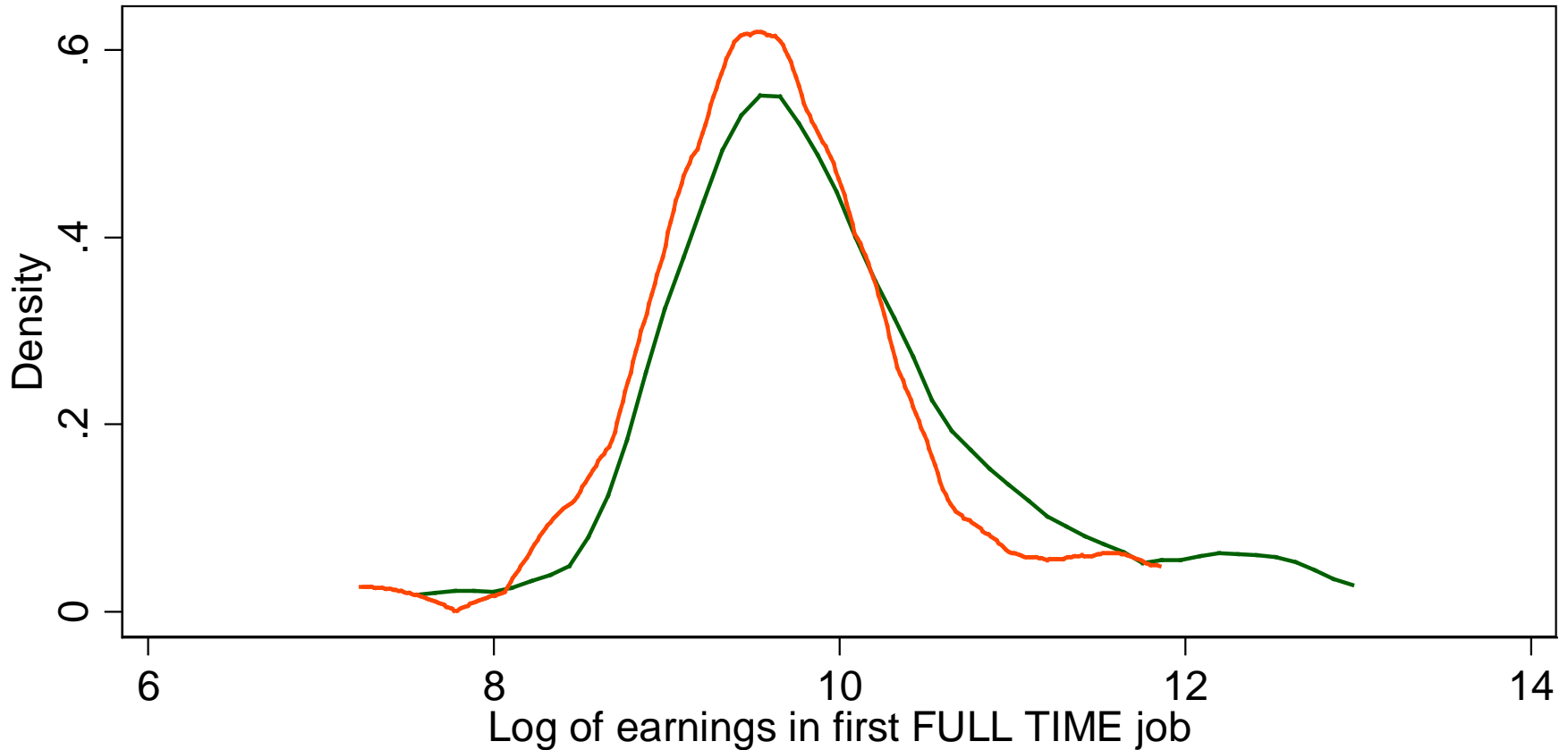
	N	Control Mean	Effect	P-Value
Labor Force Participation				
Employed	103	0.67	0.15	0.07
Log Earnings				
1 st job	100	9.57	0.53	0.00
1 st full time job	99	9.64	0.46	0.01
Last job	102	9.34	0.51	0.01
Current job	68	9.58	0.40	0.06

Kernel density estimate



kernel = epanechnikov, bandwidth = 0.3279

Kernel density estimate



Log of earnings in first FULL TIME job

— Stimulated

— Control

kernel = epanechnikov, bandwidth = 0.3147

Kernel density estimate

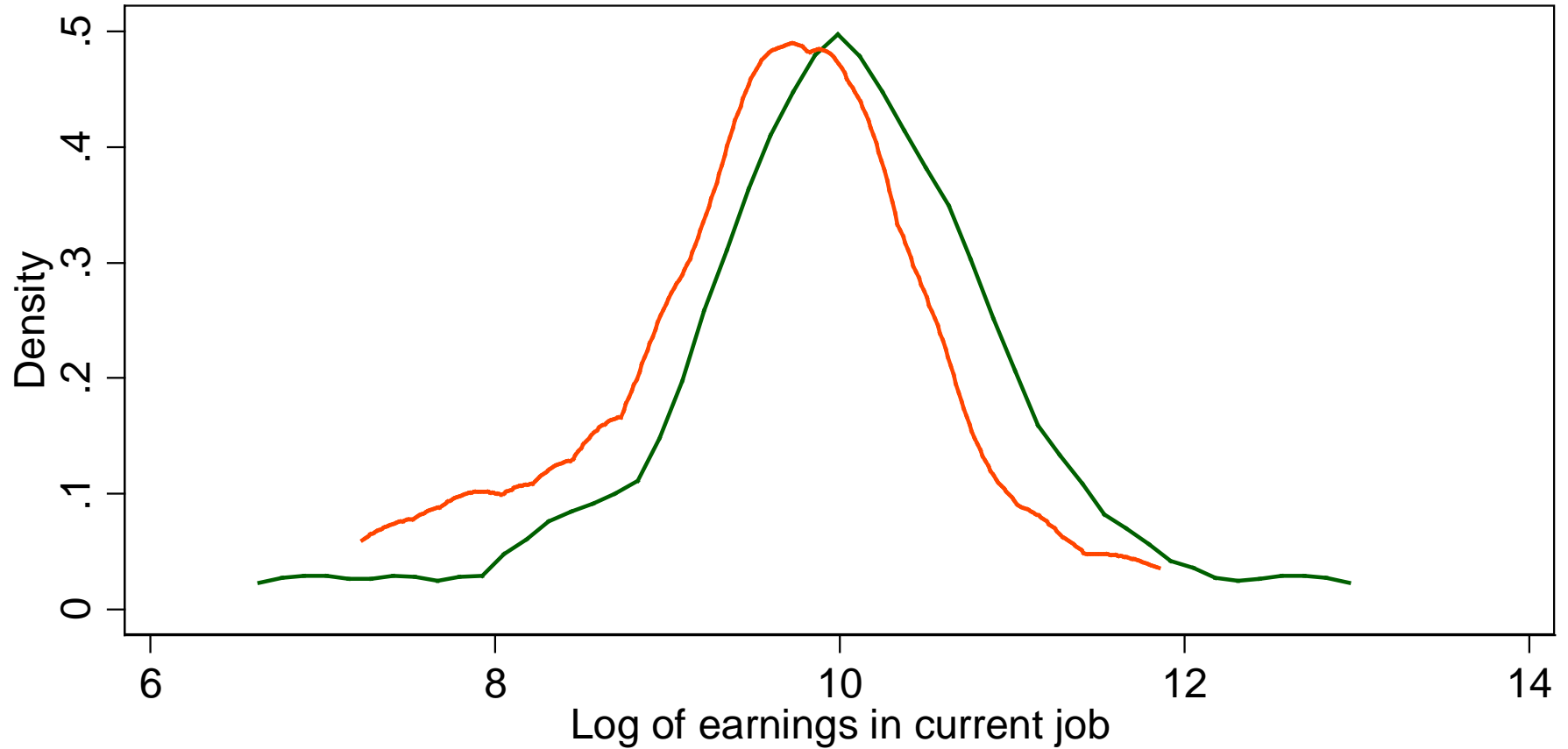


Log of earnings in last job

- Stimulated
- Control

kernel = epanechnikov, bandwidth = 0.4264

Kernel density estimate



kernel = epanechnikov, bandwidth = 0.3096

Table 8: Robustness of Effect on Log Earnings to Migration & Sample Attrition

	Original Sample		Exclude Migrants		Impute Earnings for All Missing Observations	
	Effect	P-Value	Effect	P-Value	Effect	P-Value
1 st job	0.529	0.004	0.359	0.018	0.370	0.010
1 st full time job	0.460	0.008	0.233	0.040	0.315	0.026
Last job	0.507	0.014	0.357	0.052	0.355	0.050
Current job	0.396	0.060	0.233	0.152	0.255	0.056

Table 9: Robustness of Log Current Earnings Estimates to
Labor Force Participation Selection

Sample and Estimation Method	N	Effect	P-Value
All Observations in Labor Force	68	0.396	0.072
Observations in Labor Force & Not in School	52	0.676	0.010
Heckman Selection for Whole Sample ⁺⁺	105	0.411*	0.010
Heckman Selection for Sample of Non-Students ⁺⁺	85	0.647**	0.016

⁺ Coefficients and standard errors from a regression controlling for baseline characteristics are reported in parentheses.

⁺⁺ Heckman selection models estimated with Marital Status and Number of Children included in first stage.

Table 11: Comparison to Non-Stunted Children

	Non Stunted – Treatment	P- value	Non Stunted - Control	P- Value
Total years school	0.13	0.33	0.59	0.01
Log Earnings				
First job	-0.03	0.61	0.35	0.03
First full time job	-0.01	0.69	0.24	0.05
Last job	0.04	0.42	0.41	0.02
Current job	-0.12	0.73	0.28	0.09

Conclusions

- ECD at least as important as other school policies for educational and labor market outcomes
- Large labor market returns to very early childhood stimulation for disadvantaged children
 - Policy to help disadvantaged children catch-up
 - Important route to reduce inequality
- Limitation
 - Small sample efficacy trial
 - How to scale up?